

CLAIMS

What is claimed is:

- 1 1. An assembly for conducting an electronic signal, the assembly comprising:
2 a substrate having distinct first and second regions to enable connection to first and second
3 circuit boards, respectively, the first and second regions including respective first and
4 second through-holes formed in the substrate; and
5 a first electronic cable disposed within the first through-hole and extending out of the first
6 through hole, adjacent the substrate and into the second through-hole.
- 1 2. The assembly of claim 1 wherein the first electronic cable comprises first and second ends
2 disposed in the first and second through-holes, respectively.
- 1 3. The assembly of claim 2 further comprising a first conductive plating disposed about an
2 interior surface of the substrate that defines the first through-hole and a second conductive
3 plating disposed about an interior surface of the substrate that defines the second through-
4 hole, and wherein the first electronic cable includes a first conductor having a first end
5 disposed in electrical contact with the first conductive plating and a second end disposed in
6 electrical contact with the second conductive plating.
- 1 4. The assembly of claim 3 wherein the first conductor is soldered to the first conductive
2 plating.
- 1 5. The assembly of claim 3 wherein the first through-hole is filled with conductive material.
- 1 6. The assembly of claim 3 wherein the first through-hole is adapted to receive a conductive

2 pin that extends from a circuit board connector of the first circuit board.

1 7. The assembly of claim 3 further comprising a conductive pin secured within the first
2 through-hole and projecting out of the first through-hole to enable connection with a
3 female connector of the first circuit board.

1 8. The assembly of claim 7 wherein the first and second-through holes extend between first
2 and second parallel surfaces of the substrate, the conductive pin projecting out of the first
3 through-hole at the first surface, and the first end of the electronic cable entering the first-
4 through hole at the second surface.

1 9. The assembly of claim 1 wherein the electronic cable comprises a coaxial cable having a
2 center conductor and having an outer conductor disposed concentrically about the center
3 conductor.

1 10. The assembly of claim 1 wherein the first electronic cable comprises:
2 a pair of wires that extend parallel to one another along the length of the first electronic
3 cable;
4 an insulating material disposed about the pair of wires; and
5 a conductive shield disposed about the insulator.

1 11. The assembly of claim 1 wherein the first electronic cable comprises a twisted pair of
2 insulated wires.

1 12. The assembly of claim 2 wherein the first and second regions each include a plurality of
2 other through-holes, and wherein the assembly further comprises a plurality of other

3 electronic cables extending from the first region to the second region, each of the plurality
4 of other electronic cables having a first end disposed in a respective one of the other
5 through-holes in the first region and a second end disposed in a respective one of the other
6 through-holes in the second region.

1 13. The assembly of claim 11 wherein each of the plurality of other electronic cables comprises
2 a coaxial cable.

1 14. The assembly of claim 11 wherein each of the plurality of other electronic cables comprises
2 a pair of wires disposed within an insulator and a shield disposed about the insulator.

1 15. The assembly of claim 11 wherein each of the plurality of other electronic cables comprises
2 a twisted pair of insulated wires.

1 16. The assembly of claim 1 wherein the first and second regions are disposed on a first planar
2 surface of the substrate, and wherein the first electronic cable includes a first conductor that
3 extends through the first through-hole to the first planar surface of the substrate.

1 17. The assembly of claim 16 wherein the first conductor comprises a first end disposed
2 parallel to the first planar surface to receive a mating contact that extends from a circuit
3 board connector of the first circuit board.

1 18. The assembly of claim 17 wherein the first conductor extends through the second through-
2 hole and comprises a second end disposed parallel to the first planar surface to receive a
3 mating contact that extends from a circuit board connector of the second circuit board.

- 1 19. The assembly of claim 17 wherein the first electronic cable further includes a second
2 conductor that extends through the first through-hole to the first planar surface of the
3 substrate, the second conductor having a second end disposed parallel to the first flat end.
- 1 20. The assembly of claim 17 wherein the first end is disposed substantially flush with the first
2 planar surface.
- 1 21. The assembly of claim 17 wherein the first end has a substantially flat surface that is
2 perpendicular to an axis of extension of the first conductor.
- 1 22. The assembly of claim 17 further comprising a dielectric disposed over the first end of the
2 first conductor to establish a capacitive coupling between the first conductor and the
3 mating contact that extends from the circuit board connector.
- 1 23. The assembly of claim 22 wherein the dielectric has a thickness and dielectric constant
2 selected to achieve a desired capacitance between the first conductor and the mating
3 contact that extends from the circuit board connector.
- 1 24. The assembly of claim 1 wherein the first and second regions are disposed on a first planar
2 surface of the substrate, and wherein the first electronic cable includes a first conductor that
3 extends within the first through-hole to a selected depth relative to the first planar surface.
- 1 25. The assembly of claim 1 wherein the first and second regions are disposed on a first planar
2 surface of the substrate, and wherein the first electronic cable includes a first conductor that

3 extends within the first through-hole and has a substantially flat end recessed relative to the
4 first planar surface to receive a mating contact that extends into the first through-hole.

1 26. The assembly of claim 1 wherein the first and second regions are disposed on a first planar
2 surface of the substrate, and wherein the first electronic cable includes a first conductor that
3 extends through the first through-hole and projects out of the first through-hole at a first
4 end, the first end being substantially flat end to receive a mating contact of a circuit board
5 connector of the first circuit board.

1 27. The assembly of claim 1 wherein the substrate has conductive traces disposed thereon.

1 28. The assembly of claim 27 wherein the substrate comprises a plurality of layers including a
2 first layer having an interior surface disposed in contact with an interior surface of another
3 of the layers, and wherein at least a portion of the plurality of conductive traces are
4 disposed on the interior surface of the first layer.

1 29. The assembly of claim 1 wherein the substrate comprises first, second and third component
2 substrates, the first component substrate having first and second openings that define the
3 first and second regions, respectively, and the second and third component substrates being
4 disposed in the first and second openings, respectively, the first through-hole being
5 disposed in the second component substrate and the second through-hole being disposed in
6 the third component substrate.

1 30. An assembly comprising:
2 a substrate having first and second substantially parallel outer surfaces, and first and second
3 through-holes that each extend from the first outer surface to the second outer

4 surface;
5 a plurality of conductive traces formed on the substrate; and
6 a first cable extending out of the first through-hole, adjacent the second outer surface of the
7 substrate, and into the second through-hole, the first cable including a first electronic
8 conductor having first and second flat ends.

1 31. The assembly of claim 30 wherein the first and second flat ends of the first electronic
2 conductor are disposed within the first and second through-holes, respectively.

1 32. The assembly of claim 30 wherein the first and second flat ends of the first electronic
2 conductor are substantially coplanar with the first surface of the substrate.

1 33. The assembly of claim 30 wherein the first cable further comprises a second conductor
2 having first and second flat ends disposed within the first and second through-holes.

1 34. The assembly of claim 30 wherein the first cable further comprises a conductive shield
2 extending along the length of the cable and disposed about the first electronic conductor.

1 35. The assembly of claim 30 wherein the first cable comprises an insulating material
2 extending along the length of the cable and disposed about the first electronic conductor.

1 36. The assembly of claim 35 wherein a terminal portion of the first electronic conductor
2 extends beyond the insulating material and terminates at the first flat end, the terminal
3 portion being disposed to enable deflection of the first flat end in response to a contact
4 force applied to the first flat end.

1 37. The assembly of claim 35 wherein a terminal portion of the first electronic conductor
2 extends beyond the insulating material and terminates at the first flat end, the terminal
3 portion including at least one bend to enable deflection of the first flat end in response to a
4 contact force applied to the first flat end.

1 38. The assembly of claim 37 wherein the first electronic conductor is formed from a resilient
2 material such that, when deflected in response to the contact force, the first flat end of the
3 first electronic conductor is urged in a direction opposite the direction of the contact force.

1 39. The assembly of claim 37 further comprising a conductive plating on the surface of the
2 terminal portion of the first electronic conductor, the terminal portion of the first electronic
3 conductor and conductive plating having a higher modulus of elasticity than the terminal
4 portion of the first electronic conductor alone.

1 40. The assembly of claim 37 wherein the terminal portion includes two bends having
2 substantially equal bend angles, the two bends including the at least one bend.

1 41. The assembly of claim 37 wherein the terminal portion includes three bends, including the
2 at least one bend, and wherein the flat end of the first electronic conductor is disposed
3 substantially axially aligned with an insulated portion of the first electronic conductor.

1 42. The assembly of claim 30 further comprising:
2 a first printed circuit board;
3 a first integrated circuit device affixed to the first printed circuit board; and
4 a first connector affixed to the first printed circuit board and removably connected to the

5 substrate, the first connector including a conductive contact electrically coupled to the
6 first integrated circuit device and disposed in contact with the first flat end of the first
7 electronic conductor.

1 43. The assembly of claim 42 further comprising:
2 a second printed circuit board;
3 a second integrated circuit device affixed to the second printed circuit board; and
4 a second connector affixed to the second printed circuit board and removably connected to
5 the substrate, the second connector including a conductive contact electrically
6 coupled to second integrated circuit device and disposed in contact with the second
7 flat end of the first electronic conductor.

1 44. The assembly of claim 42 wherein the first printed circuit board includes a first contact pad
2 electrically coupled to the first integrated circuit device, a second contact pad electrically
3 coupled to the conductive contact and a conductive trace extending from the first contact
4 pad to the second contact pad.

1 45. The assembly of claim 44 wherein the conductive contact is electrically coupled to the
2 second contact pad via a second electronic cable disposed within the first connector.

1 46. The assembly of claim 42 further comprising a second electronic cable extending from the
2 first integrated circuit device to the first connector to establish electrical contact between
3 the first integrated circuit device and the conductive contact.

1 47. The assembly of claim 42 further comprising a second cable extending from the first
2 integrated circuit device to the first connector, the second cable having a second electronic

3 conductor having a first end that constitutes the conductive contact.

1 48. The assembly of claim 47 wherein the second cable comprises an insulating material
2 extending along the length of the cable and disposed about the second electronic conductor.

1 49. The assembly of claim 48 wherein a terminal portion of the second electronic conductor
2 extends beyond the insulating material and terminates at the first end, the terminal portion
3 including at least one bend to enable deflection of the first end in response to the contact
4 with the first flat end of the first electronic conductor.

1 50. The assembly of claim 49 wherein the second electronic conductor is formed from a
2 resilient material such that, when deflected in response to the contact with the first flat end
3 of the first electronic conductor, the first end of the terminal portion is urged against the
4 first flat end of the first electronic conductor.

1 51. The assembly of claim 49 further comprising a conductive plating on the surface of the
2 terminal portion of the second electronic conductor, the terminal portion of the second
3 electronic conductor and conductive plating having a higher modulus of elasticity than the
4 terminal portion of the second electronic conductor alone.

1 52. The assembly of claim 30 wherein the substrate comprises a plurality of layers including a
2 first layer having an interior surface disposed in contact with an interior surface of another
3 of the layers, and wherein at least a portion of the plurality of conductive traces is formed
4 on the interior surface of the first layer.

1 53. An assembly comprising:

2 a substrate having first and second substantially parallel outer surfaces, and a first
3 conductive via that extends from the first outer surface to the second outer surface;
4 a plurality of conductive traces formed on the substrate;
5 a first integrated circuit device disposed on the first outer surface of the substrate, the
6 integrated circuit device having a first contact electrically coupled to one of the
7 plurality of conductive traces, and a second contact electrically coupled to the first
8 conductive via; and
9 a first cable extending out of the first conductive via and having a first electronic conductor
10 electrically coupled to the first conductive via.

1 54. The assembly of claim 53 wherein the substrate comprises a plurality of layers including a
2 first layer having an interior surface disposed in contact with an interior surface of another
3 of the layers, and wherein at least a portion of the plurality of conductive traces is formed
4 on the interior surface of the first layer.

1 55. The assembly of claim 53 wherein the substrate has a second conductive via that extends
2 from the first outer surface to the second outer surface, and wherein the first integrated
3 circuit device has a third contact electrically coupled to the second conductive via, the
4 assembly further comprising a second cable extending out of the second conductive via and
5 having a second electronic conductor electrically coupled to the second conductive via.

1 56. The assembly of claim 53 wherein the first conductive via is defined by a plated annular
2 wall of the substrate, the plated annular wall including a first plated region that extends
3 from the first outer surface to the second outer surface, and a second plated region that
4 extends from the first outer surface to the second outer surface, the first and second plated

5 regions being electrically isolated from one another.

1 57. The assembly of claim 56 wherein the first electronic conductor is soldered to the first
2 plated region and wherein the first cable further comprises a second electronic conductor
3 soldered to the second plated region.

1 58. The assembly of claim 53 wherein the first electronic conductor is soldered to the first
2 conductive region.

1 59. The assembly of claim 53 wherein the substrate has a second conductive via that extends
2 from the first outer surface to the second outer surface, and wherein the first cable extends
3 to the second conductive via and the first electronic conductor is electrically coupled to the
4 second conductive via, the assembly further comprising a second integrated circuit device
5 disposed on the first outer surface of the substrate, the second integrated circuit device
6 having a first contact electrically coupled to one of the plurality of conductive traces, and a
7 second contact electrically coupled to the second conductive via.

1 60. The assembly of claim 53 wherein the cable comprises a conductive shield disposed about
2 the first electronic conductor and extending along the length of the first cable.

1 61. An assembly comprising:
2 a first substrate having a plurality of through-holes therein;
3 a second substrate having a plurality of through-holes therein; and
4 a plurality of cables extending from the plurality of through-holes in the first substrate to
5 the plurality of through-holes in the second substrate, each of the plurality of cables
6 including a first conductor having a first exposed end disposed at a surface of the first

7 substrate to receive a first contact of a first removable connector and a second
8 exposed end disposed at a surface of the second substrate to receive a first contact of
9 a second removable connector.

1 62. The assembly of claim 61 wherein each of the plurality of cables further includes a second
2 conductor having a first exposed end disposed at the surface of the first substrate to receive
3 a second contact of the first removable connector and a second exposed end disposed at the
4 surface of the second substrate to receive a second contact of the second removable
5 connector.

1 63. The assembly of claim 61 wherein each of the plurality of cables comprises a conductive
2 shield disposed about the first conductor.

1 64. The assembly of claim 61 further comprising a third substrate having a substantially planar
2 first surface and first and second openings in the first surface, and wherein the first and
3 second substrates are disposed in the first and second openings, respectively, such that the
4 surfaces of the first and second substrate are substantially coplanar.

1 65. The assembly of claim 64 wherein the first and second substrates are disposed in the first
2 and second openings, respectively, such that the surfaces of the first and second substrates
3 are substantially coplanar with the first surface of the third substrate.

1 66. The assembly of claim 64 wherein the first substrates is secured within the first opening by
2 a retaining member.

1 67. The assembly of claim 64 wherein the first substrate is moveably secured to the third

2 substrate to enable movement of the first substrate within the first opening.

1 68. The assembly of claim 67 wherein the first substrate is pivotably secured to the third
2 substrate to enable rotation of the first substrate within the first opening.

1 69. The assembly of claim 64 wherein the third substrate comprises a plurality of conductive
2 traces disposed thereon.

1 70. The assembly of claim 69 wherein the third substrate comprises a plurality of layers
2 including a first layer having an interior surface disposed in contact with an interior surface
3 of another of the layers, and wherein at least a portion of the plurality of conductive traces
4 are disposed on the interior surface of the first layer.

1 71. An assembly comprising:
2 a first substrate having a first and second openings;
3 a second substrate disposed in the first opening and having a plurality of through-holes;
4 a third substrate disposed in the second opening and having a plurality of through-holes;
5 and
6 a plurality of cables extending from the plurality of through-holes in the second substrate to
7 the plurality of through-holes in the third substrate, each of the plurality of cables
8 including a first conductor having a first exposed end disposed at a surface of the
9 second substrate and a second exposed end disposed at a surface of the third
10 substrate.

1 72. The assembly of claim 71 wherein the second substrate is moveably coupled to the first
2 substrate.

1 73. The assembly of claim 71 further comprising a first circuit board assembly having a
2 connector that includes a first plurality of contacts each disposed in contact with the first
3 exposed end of the first conductor included in a respective one of the plurality of cables.

1 74. The assembly of claim 73 further comprising a second circuit board assembly having a
2 connector that includes a first plurality of contacts each disposed in contact with the second
3 exposed end of the first conductor of a respective one of the plurality of cables.

1 75. The assembly of claim 73 wherein the connector further includes a supply voltage contact
2 coupled to a supply voltage conductor disposed on the first substrate.

1 76. The assembly of claim 75 wherein the first substrate comprises a plurality of layers
2 including a first layer having an interior surface disposed in contact with an interior surface
3 of another of the layers, and wherein the supply voltage conductor is printed on the interior
4 surface of the first layer.

1 77. The assembly of claim 73 wherein each of the plurality of cables includes a second
2 conductor having a first exposed end disposed at a surface of the second substrate and a
3 second exposed end disposed at a surface of the third substrate.

1 78. The assembly of claim 77 wherein the connector further includes a second plurality of
2 contacts each disposed in contact with the first exposed end of the second conductor
3 included in a respective one of the plurality of cables.

1 79. The assembly of claim 73 wherein the first circuit board assembly comprises:

2 a first integrated circuit device; and
3 a cable coupled between the first integrated circuit device and the connector.

1 80. The assembly of claim 71 further comprising a dielectric material disposed over the
2 exposed ends of the first conductors of the plurality of cables.

1 81. The assembly of claim 80 further comprising a first circuit board assembly having a
2 connector that includes a first plurality of contacts, each of the contacts being spaced apart
3 from an exposed end of a respective one of the first conductors by the dielectric material.

1 82. An connector comprising:
2 a housing having a first surface and a second surface; and
3 a first cable extending through the housing, the first cable including a first conductor and
4 an insulating material disposed about the first conductor, the first conductor including
5 a terminal portion that extends beyond the insulating material and terminates at a first
6 end, the terminal portion including at least one bend to enable deflection of the first
7 end in response to a contact force applied to the first end.

1 83. The connector of claim 82 wherein the first conductor is formed from a resilient material
2 such that, when deflected in response to the contact force, the first end of the first
3 conductor is urged in a direction opposite the direction of the contact force.